A Parity Dependent Model for Couple Fertility

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Much attention has been paid to the derivation of increasingly realistic models for couple fertility. During the last two and half decades various authors like Joshi, Sheps, Perrin, Potter, Parker, Singh and Bhatacharya have given models which yield different probability distributions for studying the fertility of married women. In almost all works, the fertility has been treated as constant over time. Aggarwal and Srivastava (1981) were first to propose an age dependent fertility model which assumes that the occurrence of a conception is a chance event in which the rate of conception $p(x)$ at age x first increases, attains a maximum and then decreases asymptotically to zero. In the present work another age dependent fertility model has been proposed which, starting from a certain maximum, comes down and later become asymptotic to zero with the increase in age. Although the present model does not appropriately describe the population for the whole range, it is observed that it gives a much better description for women in the higher age group and/or for higher parity.

The model assumes that the probability that a nonpregnant fecund women will conceive in age interval $(x, x+\mathrm{d}x)$; rth time is $p^{(r)}_{x_0}(x)\,\mathrm{d}x+\mathrm{o}(\mathrm{d}x)$, independent of previous conception where

$$p^{(r)}_{x_0}(x)=\frac{\theta^{(r)}_{x_0}}{x+k}, \quad x_0<x<\infty.$$

k is an unknown parameter, x_0 is the age at marriage of the female and r denotes the parity. Based on the above model the probability distribution of the observable variable interval between rth and $r+1$th conception (denoted by T_r) is derived and subsequently the expected value of T_r has been found as below:

$E(T_r)=h$ = Expected waiting time for conception at age a_r+h.

$$E(T_r)=\frac{1}{\theta^{(r)}-1}a_r+\frac{\theta^{(r)}h+k}{\theta^{(r)}-1}.$$

The parameters of the model can be estimated by the least squares method. Although the estimators of $\theta^{(r)}$ and k are not unbiased they are consistent. A comparison of $\theta^{(r)}$ for different r gives the effect of parity on fertility. The model has been fitted to data from a rural area in Haryana and $\theta^{(r)}$ compared for different values of r.

A Theoretical Model for Reduction in Fertility through a Simulated Programme of Sterilization

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A theoretical model for the reduction in fertility through a simulated programme of sterilization has been presented in this paper. Application of this model to the

Uttar Pradesh population (base 1981) demonstrates that the birth rate of about 36.50 per thousand population comes down to 24.40 in a decade. On titeration the birth rate comes down to 22.34 by the year 2015.